Emissions Trading to Reduce Acid Deposition

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I. INTRODUCTION

Since 1974, the Environmental Protection Agency (EPA) has experimented with various emissions trading policies through its clean air program.[1] These policies have established markets in which polluters trade emissions reduction credits. The aim has been to allow polluters greater flexibility in choosing how to control pollution, so as to reduce overall costs of pollution abatement.[2] Scholars have reviewed the performance of these policies and credited them with cost savings to industry in the hundreds of millions of dollars.[3] Despite these savings, analysts have noted many flaws in these experimental systems, which they claim have led to a reluctance on the part of polluters to use the

1. Until now, EPA's "controlled trading options" have included "netting," "bubbling," "offsets," and "banking." "Netting" permits a polluter to avoid the review process mandated whenever a plant expands or modifies to such an extent that it expects to increase its emissions in excess of a specified amount. The polluter must reduce emissions from another source within the same plant so that the net increase in plantwide emissions remains below the specified level. *See* T. TIETENBERG, EMISSIONS TRADING: AN EXERCISE IN REFORMING POLLUTION POLICY 8 (1985); Hahn & Hester, *Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program*, 6 YALE J. ON REG. 109, 132-33 (1989). Netting accounts for the greatest percentage of trading activity to date. *Id.* at 133. The more liberal "bubbling" policy permits sources to purchase emission reduction credits (ERC's, the currency of emissions trading, are earned by reducing emissions below level prescribed by regulations. 51 Fed. Reg. 43,832 (1986)) from other regulated sources, regardless of whether the sources are within the same plant, or owned or operated by the same party. *See* T. TIETENBERG, *supra*, at 8; Hahn & Hester, *supra*, at 123. "Offsets" allow new or expanding sources to locate in nonattainment areas (areas which exceed government standards limiting the local concentration of a given pollutant), despite the mandate that these areas meet ambient air quality standards "as expeditiously as possible." The new or altered sources must acquire a greater number of ERCs than their expected emissions, so that total emissions in the area will decrease when these sources begin operation. *See* T. TIETENBERG, *supra*, at 7-8; Hahn & Hester, *supra*, at 119. "Banking" allows sources to store their ERC's for later use or trading. *See* T. TIETENBERG, *supra*, at 8-9; Hahn & Hester, *supra*, at 129-30.

2. *See, e.g.*, T. TIETENBERG, *supra* note 1, at 7-12; Dudek & Palmisano, *Emissions Trading: Why is this Thoroughbred Hobbled?*, 13 COLUM. J. ENVTL. L. 217, 218 (1988); Hahn, *Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders*, 3 J. ECON. PERSP. 95, 103 (1989); Hahn & Hester, *supra* note 1, at 109. EPA also cites this reason as the motivation to use economic incentives. *Clean Air Act Reauthorization: Hearings on H.R. 3030 Before the Subcomm. on Energy and Power of the Comm. on Energy and Commerce*, 101st Cong., 1st Sess., pt. 2, at 17-19 (1989) [hereinafter *House Hearings pt. 2*] (testimony of William K. Reilly, Administrator, EPA) (These hearings focus on an earlier draft of the Amendment, but the cited portions are equally relevant to the enacted Amendment.).

3. *See, e.g.*, T. TIETENBERG, *supra* note 1, at 52-56, 58; Ackerman & Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUM. J. ENVTL. L. 171, 185 (1988); Dudek & Palmisano, *supra* note 2, at 233-34; Hahn, *supra* note 2, at 100-01; Hahn & Hester, *supra* note 1, at 124-28.

available markets.[4] Critics insist that were EPA to eliminate these flaws, a more efficient market and even greater cost savings would result.[5]

Title IV of the 1990 Amendments to the Clean Air Act[6] (hereinafter "the Amendment") offers one attempt to improve upon EPA's existing trading schemes.[7] This Amendment, an alternative to a proposal first introduced in Congress by President Bush in 1989,[8] aims to reduce acid deposition by establishing a market system to trade sulfur dioxide (SO_2) allowances.[9] The polluters receive emission allowances which they are free to trade among themselves.[10]

In theory, the operation of an allowance market system is straightforward. If it were more expensive for polluter *A* to eliminate ten tons of emissions than for polluter *B* to eliminate ten tons over and above its required reductions, then

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4. Hahn & Hester, *supra* note 1 (thoroughly discussing problems and successes of EPA's controlled trading options); *see also* T. TIETENBERG, *supra* note 1, at 9-12; Hahn, *supra* note 2, at 97-103; Portnoy, *Reforming Environmental Regulation: Three Modest Proposals*, 13 COLUM. J. ENVTL. L. 201, 207-08 (1988); Tripp & Dudek, *Institutional Guidelines for Designing Successful Transferable Rights Programs*, 6 YALE J. ON REG. 369 (1989); Note, *Transplanting Emissions Trading to Interstate Areas: Will It Take Root?*, 5 PACE ENVTL. L. REV. 297, 312-16 (1987) (authored by Stephen Winslow).

5. "[T]he general failure of active markets in emission reduction credits to develop is the greatest disappointment of emissions trading." Hahn & Hester, *supra* note 1, at 151. *See also* T. TIETENBERG, *supra* note 1, at 188-215; Hahn, *supra* note 2, at 101; Hahn & Hester, *supra* note 1, at 115-18, 122, 151-53; Roberts, *Some Problems of Implementing Marketable Pollution Rights Schemes: The Case of the Clean Air Act*, in REFORM OF ENVIRONMENTAL REGULATION 93, 102 (W. Magat ed. 1982); Tripp & Dudek, *supra* note 4, at 374-77, 385-86; Note, *supra* note 4, at 312-16. *See generally* Hahn & Hester, *supra* note 1; Hahn & Noll, *Barriers to Implementing Tradeable Air Pollution Permits: Problems of Regulatory Interactions*, 1 YALE J. ON REG. 63 (1983).

6. Clean Air Act Amendments of 1990, Pub. L. 101-549, 104 Stat. 2399. Due to a drafting error, the 1990 Amendments add a second Title IV to the Clean Air Act. This should change in the future.

7. The Amendment's scheme replaces a command and control system that relied heavily on "best available control technology" (BACT) standards. These standards require polluters to reduce overall emissions as much as is technically and economically feasible. Arguably, however, technology forcing is a foolish way to regulate. First, setting and meeting command and control regulations for SO_2 is costly and complex; as a result, regulators often take no action at all. Second, it is not necessarily optimal to reduce pollution by the greatest amount possible, no matter what the cost to society. The goal is to clean the air, not to promote the use of certain technology. The positive social benefits of an astronomically costly reduction in emissions might be minimal. Market schemes allow society to choose which risks are acceptable. However, environmental risks are frequently unknown, while costs are not. Thus, abandoning a commitment to the extreme position reflected in technology-forcing makes it easier for industry to slide Congress down the slippery slope of subjective cost-benefit analyses. A market scheme only reduces overall emissions of the regulated pollutant by the amount politicians have chosen, which hopefully correlates to the amount required to protect human health.

8. H.R. 3030, 101st Cong., 2d Sess., 135 CONG. REC. H4450-51 (1989); S. 1490, 101st Cong., 2d Sess., 135 CONG. REC. S9934 (1989).

9. The burning of fossil fuels releases sulfur and nitrogen. These elements combine with oxygen and moisture to create sulfuric and nitric acids. The acids form dry particles or mix with rain, snow, fog, or frost to form acid deposition. The wind often transports these acids and deposits them hundreds of miles away. Greenpeace Action, Acid Rain Pamphlet (available from Greenpeace Action, Washington, D.C.); S. REP. No. 228, 101st Cong., 1st Sess., 261-64 (1989) [hereinafter SENATE REPORT] (This report discusses an earlier draft of the Amendment, but the cited portions are equally relevant to the enacted Amendment.)

10. Many critics of marketable permit schemes have expressed concern that giving allowances to polluters vests in them a property right to pollute. In fact, the Amendment temporarily permits polluters to emit limited quantities of pollutants, and explicitly states that an "allowance does not constitute a property right." Pub. L. 101-549, sec. 401, § 403(f), 104 Stat. 2399, 2584-2631 (1990) (to be codified at 42 U.S.C. § 7651b(f)) [hereinafter the provisions of section 401 of the Clean Air Act Amendments Bill of 1990 will be referred to by the section numbers assigned to them within section 401 of Pub. L. 101-549, 104 Stat. 2584-2631 (1990)].

it would be less expensive for all parties in the aggregate if the government were to permit *A* to meet its reduction requirements by paying *B* to reduce its emissions of the regulated pollutant by an additional 10 tons. The same reduction in emissions would be achieved (twenty tons), but in the most cost-effective manner and at a cost savings to both *A* and *B*. Obviously, it would be an administrative nightmare for the government to determine the most efficient reduction schedule for each polluter. A trading scheme uses the market to identify the polluters whose abatement costs are lowest and to motivate them to undertake most of these reductions.[11]

This Note evaluates the market system established by Title IV. Part II briefly summarizes the Amendment. Part III explores possible exchange methods (i.e., how the allowances are to change hands). It demonstrates that a periodic auction exchange method would produce a more efficient and equitable trading system than the one adopted. Part IV speculates on how well the adopted system will function. This Note aims to show that but for opposing political pressure, Congress would have chosen a less complicated, more equitable exchange method. The Note concludes that the Amendment nevertheless provides this country with an excellent market system with which to combat acid deposition.

II. A SUMMARY OF THE AMENDMENT

A. *General Structure*

The Amendment regulates "affected sources"[12] in three stages so the SO_2 reductions may be achieved progressively. Affected sources begin Phase I reductions by January 1, 1995 and Phase II reductions by January 1, 2000.[13] They must maintain the final reductions, scheduled for 2010, indefinitely.[14]

The Administrator will allocate allowances to affected sources.[15] Each emissions allowance authorizes its holder to emit one ton of SO_2 "during or

11. For an explanation of why market mechanisms work efficiently, see T. TIETENBERG, *supra* note 1, at 15-16 (managers of regulated sources know each individual abatement cost function and, therefore, know how much each source should be willing to pay in order to pollute given amount). Extensive literature exists debating the appeal of market regulatory schemes. *See, e.g.*, Ackerman & Stewart, *supra* note 3, at 171; Hahn & Noll, *Designing a Market for Tradeable Emissions Permits*, in REFORM OF ENVIRONMENTAL REGULATION 119, 120 n.2 (W. Magat ed. 1982); Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and "Fine-Tuning" Regulatory Reforms*, 37 STAN. L. REV. 1267 (1985); Stewart, *Controlling Environmental Risks Through Economic Incentives*, 13 COLUM. J. ENVTL. L. 153 (1988); Tripp & Dudek, *supra* note 4, at 369 n.3.

12. For the purposes of the Amendment, all compulsory affected sources are fossil fuel-fired electrical utility units, run on either coal, gas, or oil. *See* § 405(a) in conjunction with §§ 402(15), (17). Other sources may elect to be designated affected under section 410. The terms "sources" and "polluters" are used interchangeably as shorthand for the owners or operators of affected sources.

13. §§ 404(a), 405(a).

14. § 403(a)(1).

15. § 403(a)(1).

after a specified calendar year,"[16] and no affected source may emit SO_2 without possessing an allowance that permits the emission.[17] Once the Administrator has promulgated the necessary regulations, the polluter is free to use its allowances or to trade them with any of the "designated representatives of the owners or operators of affected sources under this title and any other person who holds such allowances . . . ."[18]

All regulated sources must operate a continuous emission monitoring system (CEMS),[19] which will "provide on a continuous basis a permanent record of emissions and flow"[20] of SO_2 and other pertinent materials. The Administrator is to promulgate requirements for CEMS's, as well as for alternative systems that provide requisite data where a CEMS is not feasible.[21]

In order to execute a trade, the Administrator must record "written certification of the transfer, signed by a responsible official of each party to the transfer; . . . [a]ll allowance allocations and transfers shall, upon recordation by the Administrator, be deemed a part of each unit's permit requirements . . . without any further permit review and revision."[22] EPA will verify that the seller has sufficient allowances to make the trade, and will cross-check the information from the CEMS to insure that the seller's emissions level correlates with its reduced allowance total.[23]

B. *Allocating the Allowances*

Establishing a tradeable rights system requires a determination both of the number of allowances in the system and of the proper recipients. These factors determine the level of pollution reduction the market hopes to attain, the number and diversity of future traders, and the system's political appeal.

1. *Regulated Sources and the Number of Allowances*

Phase I traders consist of the owners or operators of the electric utility plants listed in Table A of section 404 (the largest and dirtiest of the electric utilities) or their designated representatives.[24] Phase II regulates every electric utility plant in the country except those less than twenty-five megawattage (MWe) in size. The number and diversity of the regulated sources is important

16. § 402(3).

17. § 403(g). Furthermore, "each ton emitted in excess of allowances held constitut[es] a separate violation." § 414.

18. § 403(b).

19. § 412(a).

20. § 402(7).

21. § 412(a).

22. §§ 403(b), (d).

23. *House Hearings pt. 2*, *supra* note 2, at 17-19 (testimony of William K. Reilly, Administrator, EPA); *id.* at 237, 239-40 (testimony of William G. Rosenberg, Assistant Administrator for Air and Radiation, EPA).

24. §§ 404(a)(1), (b).

because there must be an adequate supply of buyers and sellers for the market to function. Drafters of the Amendment believe that the pool of traders should be sufficient to support an active market.[25]

Phases I and II call for gradual reductions in the pool of available allowances. After 2009, the Amendment sets a permanent limitation on the total amount of SO_2 emissions permitted each year. This ceiling is commonly referred to as the "emissions cap."[26] The emissions cap is the Amendment's most important feature. It ensures that after the year 2009 there will be an unyielding ceiling of 8.9 million allowances per year (not counting allowances issued to opt-in sources or those banked from previous years).[27] Consequently, if greater productivity is demanded after 2009, sources will have to operate in a cleaner and more efficient manner in order to contain their emissions within the limits imposed by this cap. Section 403(a)(1) explicitly states that if necessary to meet the 8.9 million ton cap, "the Administrator shall reduce, pro rata, the basic Phase II allowance allocations for each unit . . . ." This crucial feature of the Amendment insures that despite all of the government subsidies and incentives, the emissions cap will be respected.

2. *Distributing the Allowances*

Determining how many allowances to disburse seems relatively simple compared to deciding how to divide them among the polluters. Since there is a cap on the total number of allowances, the more given to one source, the

25. The sizes and kinds of regulated electric utility plants vary. The mix of control options available to such a wide range of participants seems certain to provide diverse abatement cost functions. Telephone interview with Joe Goffman, former Associate Counsel to the Committee on Environment and Public Works of the U.S. Senate. (Mr. Goffman was instrumental in drafting the Amendment and guiding it through the legislative process. Presently, he serves as Consultant to the Office of Atmospheric Programs at EPA, where he is helping to write the regulations necessary to implement the Amendment.)

26. § 403(a). While science plays a prominent role in determining the amount of SO_2 emissions this country can absorb without damaging the environment, our present knowledge is imprecise and leaves ample room for both factual and political debate. *See Clean Air Act Amendments of 1989: Hearings on Acid Rain Before the Subcomm. on Environmental Protection of the Senate Comm. on Environment and Public Works*, 101st Cong., 1st Sess., pt. 6, at 3-4 (1989) (statement of William Rosenberg, Assistant Administrator, Air and Radiation, EPA) (These hearings focus on an earlier draft of the Amendment, but the cited portions are equally relevant to the enacted Amendment.).

27. Technically, the cap is not set at 8.9 million. First, section 405(a)(3) provides a fixed number of extra allowances to specified plants. Since the additional number of allowances is inflexible, it does not violate the theory of the emissions cap; it simply raises the number slightly. This Note will ignore this inconsistency.

Second, the Bill containing the Amendment sets a limit of 5.6 million tons per year on SO_2 production by industrial sources (as opposed to electric utilities). Thus the 8.9 million cap could actually be thought of as a 14.5 million ton ceiling. Since the trading scheme allows industrial sources to opt-in and would, therefore, provide them with allowances, it is important that the government both limits these sources' emissions and takes their emissions into consideration when setting the cap. In this way, the opt-in provision can increase the total number of allowances but not erode the emissions cap.

fewer available to others. Not surprisingly, the Act reflects a concerted effort by many special interest groups to secure a greater share of allowances.[28]

During Phase I, the Administrator is to allocate allowances based on the product of each unit's baseline[29] (essentially, its average past fuel consumption) multiplied by an emissions rate of 2.50 pounds of SO_2 per mmBtu (lbs/mmBtu).[30] Phase II employs a similar method to determine SO_2 reductions. However, for almost all the regulated sources, the emissions rate by which the baseline is to be multiplied is reduced from 2.50 lbs/mmBtu to 1.20 lbs/mmBtu to exact further reductions of SO_2 emissions.[31] Thus, the Amendment gives existing polluters allowances based on how much fuel they have consumed, but expects them to operate at a cleaner level during the next phase.

Calculating an allowance share in this manner is ingenious, for it is computed on the basis of a regulated source's past levels of production activity, rather than on the basis of a source's past emissions tonnage. It would have been simpler to allocate allowances according to the average of a source's past levels of emissions and achieve the desired clean-up by requiring all existing polluters to cut back either by a fixed amount or by a percentage of their emissions levels. Unfortunately, this rule would have rewarded dirty sources with extra allowances.[32] Some sources have already spent a significant amount of money in reducing their emissions. Congress did not want to penalize companies that had promptly obeyed pollution control laws in the past or to reward those that had been slow to respond to previous pollution regulations.

Fortunately, the Amendment's distribution rule avoids this inequitable result and still provides more productive plants with more allowances.[33] Affected sources are divided into two categories: those with emissions rates above 1.2 lbs/mmBtu (dirty sources) and those with emissions rates below that level

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28. For example, sections 404(a)(3) and 405(a)(3) award extra allowances to a few named utilities. These provisions represent an obvious political concession to a strong lobbying group. Many provisions were included not just in response to political pressure, but also to further legitimate social goals. For example, section 404(f) encourages energy conservation and use of renewable energy sources.

29. The baseline for an affected unit is the annual average quantity of fossil fuel consumed by that unit, measured in millions of British Thermal Units (mmBtu).

30. Telephone interview with Joe Goffman, *supra* note 25. The actual reduction requirements have already been calculated and are listed in Table A of section 404.

31. §§ 405(a)-(c). Clean sources, those already operating with emission rates below 1.20 lbs per mm/Btu, will receive allowances according to a slightly different formula set out in sections 405(d)-(e). There are also provisions by which sources can elect to have their baselines assessed by a different calculus. *See* § 404(h)(1)(C); § 405(i). Essentially, the scheme determines the total number of SO_2 allowances by calculating the average amount of fuel consumed by each regulated source and mandating a fixed reduction in the levels of SO_2 emissions per measure of fuel used. One advantage to calculating the number of allowances by assessing historic fuel consumption is that the available data is fairly accurate. Telephone interview with Nancy Kete, Office of Policy Analysis and Review, EPA (November 9, 1989).

32. Hahn, *supra* note 2, at 98.

33. The Proposal's distribution rule does not reward polluters for having been slow to clean up their emissions. For example, if two sources have been burning equal amounts of fuel in their production process, they will receive exactly the same number of allowances. This is so even if the former has installed scrubbers and has half the emissions of the latter. For a discussion of the equity concerns raised by different distribution rules, see T. TIETENBERG, *supra* note 1, at 100-01, 110-13.

(clean sources). After the year 1999, sources will be treated as though they are operating at a 1.2 emissions rate. The result is that if one of these sources has cut its emissions to a rate below 1.2, it will receive extra allowances. Clean sources receive an additional quota of allowances. An expected increase of 120% in demand for electricity production is factored into their initial allowance allocation.[34]

During Phases I and II, the Administrator will set aside additional reserves of allowances, over and above those allocated through the distribution rules just described. Congress targeted these reserves for different categories of sources, primarily to secure necessary political support or to encourage the use of certain reduction technologies.[35] Notably, the Amendment creates these allowance pools without eroding the emissions cap. In the first place, most of these reserves expire after 2009. Moreover, as mentioned earlier, section 403(a)(1) requires the Administrator to reduce pro rata everyone's share of allowances if the number scheduled for distribution would otherwise exceed the cap.[36]

Sections 404(a)(2) and 405(a)(2) create the largest reserves of allowances—called the Phase I and Phase II bonus reserves, respectively—by stealing the reductions achieved during the calendar years 1995 and 2000 and translating them into extra allowances. In practical terms, it is as if the Phase I and II reductions were postponed for a year. The Phase I bonus reserve may not exceed 3.5 million allowances.[37] The Administrator will award these allowances to Phase I plants as incentives for using "qualifying phase I technology".[38] The Phase II bonus reserve sets aside up to 5.3 million allowances.[39] The

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34. §§ 405(d)-(f).

35. *See, e.g.*, §§ 405(b)(2), (b)(4), (c)(4), (d)(3)(A)-(B), (f)(2), (h)(2), (i), 406, 409, 416. Sections 405(b)(2), (c)(4) and (d)(3(A)-(B) provide bonus allowances to units whose baselines reflect production activity well below the capacity of the unit; section 405(i) provides extra allowances to units in "high growth states"; section 406 provides extra allowances for states with extremely low emissions rates.

36. The creation of these reserves does not even significantly disturbe the the Phase I and II reduction schedules. The Amendment provides the bulk of the allowances for these reserves by robbing Peter to pay Paul. For instance, the extra allowances granted to repowered sources under section 409 come out of each utility's share of the total pool of allowances on a pro rata basis. § 405(a)(2). Similarly, section 416 establishes a reserve to accommodate both a government-supervised auction and a direct sale of allowances at a fixed price. This provision directs the Administrator to withhold 2.8% of each year's allowances beginning after the year 1995.

37. § 404(a)(2).

38. § 404(d). Qualifying Phase I technology is defined in section 402(19) and includes scrubbers. Section 404(d)(1) allows any unit that commits to using the proper technology to meet its Phase I reduction requirements to delay compliance until January 1, 1997. The unit receives allowances from the reserve pool in an amount equal to its uncontrolled emissions above the Phase I limit. § 404(d)(5). This incentive allows states whose economies are dependent on high sulfur coal mining to mandate or encourage the use of scrubbers or other technology in lieu of switching to low sulfur coal to meet reduction requirements. While subsidizing the use of scrubbers might increase the cost of pollution control at the expense of the taxpayers, a sudden conversion away from high sulfur coal would result in massive unemployment in certain regions. Similarly, while the methods encouraged by § 404(f)(2) (incentives to use conservation and renewable energy sources) could prove more expensive, they help achieve other policy goals. For a more detailed treatment of the debate concerning the wisdom of technology forcing, see Ackerman & Stewart, *supra* note 3; Latin, *supra* note 11.

39. § 405(a)(2).

Administrator will distribute 530,000 annually during Phase II to accommodate various political agendas as mandated by the Amendment.[40]

Once Congress has determined the number of allowances and their recipients, it must decide how the Administrator will transfer the allowances to affected sources. The Amendment "grandfathers" the majority of the allowances, which is to say the government gives existing polluters free emissions rights based on the distribution rule explained earlier. Thereafter, it leaves the task of redistribution to the private market. The Amendment also employs a zero-revenue auction to distribute a small portion of the allowances and a zero-revenue direct sale to ensure that a supply of allowances will be available to new sources.[41]

3. *Zero-Revenue Auctions*

Distributing allowances by auctioning them off is unpopular with industry because it requires sources to pay for allowances to pollute as well as for pollution control. Zero-revenue auctions are more politically palatable than regular auctions because they redistribute the revenues from the sale back to the polluters.[42] Sources pay for any allowances over and above what they would have received under the initial distribution rule, and they are reimbursed for all allowances they would have received but did not purchase.[43] This method of initial allocation also ensures efficiency, since polluters should not purchase more allowances than they need.

The Amendment utilizes the zero-revenue auction concept in a limited fashion. It requires the Administrator to auction 150,000 allowances annually during Phase II and 250,000 allowances each year thereafter.[44] The Administrator then redistributes the funds collected from these auctions to the owners or operators of affected sources on a pro-rata basis.[45]

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40. §§ 405(b)(2), (c)(4), (d)(3)(A)-(B), (h)(2), 406. For a brief description of the goals of some of these provisions see *supra* note 35.

41. § 416. The zero-revenue auction will be discussed in the following section. The direct sale is organized in section 416(c). Each year beginning in the year 2000, the Administrator will offer 50,000 allowances for sale at $1,500 each (adjusted by the Consumer Price Index). These allowances will be sold on a first-come, first-served basis with priority given to new, independent power producers. §§ 416(c)(1) & (2). The proceeds from these sales will be returned, on a pro rata basis, to those from whom the allowances for this reserve were withheld. At first blush, the provision for the direct sale of allowances might seem to threaten the market's pricing mechanism. *See infra* Part IV.B. However, the consensus concerning this provision is that the fixed price is so high that it will operate as neither a ceiling nor a floor for the market price. EPA's modeling showed expected allowance prices to be less than $800 per ton. *Senate Report*, *supra* note 9, at 326.

42. T. TIETENBERG, *supra* note 1, at 101; Hahn & Noll, *supra* note 11, at 141.

43. Hahn & Noll, *supra* note 5, at 75-76; Hahn & Noll, *supra* note 11, at 141.

44. § 416(d)(1).

45. § 416(d)(3). The Administrator also has discretion to discontinue the zero-revenue auctions in the event of sustained lack of participation. § 416(f). Congress would have been better advised to have allowed the Administrator to terminate the auctions whenever she became satisfied that the threat of hoarding had ended, with the option to renew the auctions if hoarding behavior were to reappear.

The Amendment's zero-revenue auction design has one troubling feature. Any source may avail itself of the government-run auction to sell its allowances.[46] This option saves private industry the transactions costs of seeking trading partners. But the Amendment prohibits the government from charging the traders a process fee to cover the costs of running the auction.[47] Providing a free auction service discourages the private sector from taking over this task. However, Congress has given EPA a choice: The Administrator may "provide for the conduct of sales or auctions under the Administrator's supervision by other departments or agencies of the United States Government *or* by nongovernmental agencies, groups, or organizations."[48] EPA should immediately delegate this responsibility to the private sector, which could pass on to the participants any administrative costs.

III. EXCHANGE METHODS

A system's "exchange method" has serious consequences for the level of efficiency and the degree of equity the market achieves. In this Note, the term "exchange method" denotes the manner by which allowances exchange hands. Participants may exchange allowances through either standard or auction sales. Standard sales are the result of bilateral negotiations between polluters, in which the government acts only as a regulator. Auction sales occur during an auction.

Both markets in which the initial allocation is administered by grandfathering allowances and markets in which auctions serve only to distribute the initial allowance allocation (*single*-auction schemes) rely almost exclusively on standard sales to transfer allowances. Once the initial distribution of allowances has either been given away or auctioned off, standard sales alone maintain the efficiency of the allocation. Auction markets[49] are different; their periodic feature forces continual active trading and makes standard sales expendable. Thus auction markets are more efficient. To explain why this is so, this Part momentarily diverts our attention from the specific legislation to explain how auction markets generally: 1) overcome psychological barriers against trading, where trading poses unknown risks and costs, 2) exact lower transactions costs, 3) yield better enforcement mechanisms, and 4) oblige polluters to compensate society for the costs imposed upon it by their polluting activities.

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46. § 416(d)(4).
47. § 416(d)(3)(A).
48. § 416(f) (emphasis added).
49. Many variations on the concept of an auction are imaginable. Auctions can be government-sponsored or privately run. Moreover, a trading scheme can use an auction solely for the initial transfer of allowances from the government to the participants or periodically to maintain an efficient distribution. In this Note, unless otherwise specified, "auction market" (or "auction scheme" or "auction system") refers to a market system which relies on periodic, government-run auctions both to distribute the initial allocation and periodically to redistribute the allowances.

A. *Exchange Methods and Efficiency*

1. *The Problem of Hoarding*

Auction markets increase participation of regulated sources by requiring all sources either to purchase allowances or cease operations. Grandfathering systems raise efficiency concerns because they allow all trading to take place through standard sales, enabling polluters to hoard allowances. Hoarding will occur if participants fear the market will fail to provide them with allowances in the future. These sources bank their excess allowances as a type of insurance. Not every source which banks its allowances qualifies as a hoarder. Hoarding occurs when it is actually in the economic interest of allowance holders to sell, but they still refuse to do so.

Were participants certain to act rationally and with perfect information, they would trade whenever they stood to benefit from doing so, and the same final allowance allocation would result under a grandfathering as under an auction scheme (assuming no transactions costs). Unfortunately, buyers and sellers do not always operate rationally and under conditions of perfect information. Experience with past trading systems indicates that polluters have sometimes foresaken the market even when, as realized in hindsight, it would have been in their economic interest to have traded.[50] One problem is that the potential sellers lack the requisite information to ascertain the point at which it would be in their economic interest to sell.

A reluctance to sell something out of a belief that future scarcity will dramatically increase its value is a normal market phenomenon. Such withholding merely drives the price up to the point where the possessor is willing to sell. However, to the extent that traders overestimate the impact of future reduction requirements and future growth needs and underestimate the benefits of future technology, the price of allowances will unnecessarily raise the overall cost of pollution control.[51] Such a result frustrates the very purpose for intro-

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50. *See* T. TIETENBERG, *supra* note 1, at 11 (claiming that industry may have been reticent to use markets in past because it feared assuming unknown risks).

51. Representatives of regulated sources have emphatically asserted their intention to withhold allowances from the market. They claim that uncertainty caused by a lack of information about future allowance needs will prevent them from ever reaching a rational decision as to the value of their excess allowances. *See House Hearings pt. 2*, *supra* note 2, at 380-81, 383 (statement of A. Joseph Dowd, Senior Vice President and General Counsel, American Electric Power Service Corp.); *id.* at 300, 304 (statement of William Berry, chairman, Virginia Power); *id.* at 388, 390 (statement of David Penn, general manager, Wisconsin Public Power Inc. on behalf of American Public Power Association); *Clean Air Act Amendments of 1989: Hearings on Acid Rain Before the Subcomm. on Environmental Protection of the Senate Comm. on Environment and Public Works*, 101st Cong., 1st Sess., pt. 5 198, 309-10 (1989) [hereinafter *Senate Hearings pt. 5*] (statement of William A. Badger, representative of National Association of Regulatory Utility Commissioners) (These hearings focus on an earlier draft of the Amendment, but the cited portions are equally relevant to the enacted Amendment.). *But see House Hearings pt. 2 supra* note 2 at 220-21 (testimony of Richard Schmalensee, member, CEA) ("[T]here may . . . be an incentive for some parties to project a response to the market that they will not wish to carry out once the market is established.")

ducing a market system: to achieve maximum pollution control at minimum cost.

Market participants who are extremely risk averse will be less likely to hoard if the government (or a private business) periodically auctions off the allowances. This consequence might not seem obvious. Presumably, just as these participants would refuse to sell at a reasonable price, they would spend excessive amounts at an auction to purchase extra allowances. Thus, the same hoarding behavior should appear during an auction. However, crucial differences exist. First, it may be easier for people to forego opportunity costs than actively to incur those same costs. Thus, while a polluter might be willing to *forego* the payment of $X in order to retain an extra allowance, it might not be willing to *pay* $X for an extra allowance.[52]

Second, the structure of a grandfathering system confers an unfair advantage on hoarders by giving them absolute price setting power. If an owner places an infinite (or excessive) value on its allowances, a buyer can offer no reasonable amount of money to induce the owner to sell. The mechanics of the grandfathering system leave the buyer powerless to change the behavior of the hoarder. During an auction, conversely, every participant starts off on an even playing field. Even those placing an infinite value on allowances will be forced to name a finite price. Their bids will be constrained practically by their economic resources. The absence of this constraint in conjunction with the psychological attachment to ownership militates against granting the present holders of allowances an indefinite right of ownership.[53]

A final advantage of an auction scheme lies in its ability to foster consumer confidence in the market. Since the allowances expire after a certain period of time and are re-auctioned, future availability is guaranteed. This assurance should give potential sellers greater confidence that they will be able to buy back the allowances they contemplate selling.

If owners of allowances refuse to sell at any reasonable price, the market will suffer. New sources will be unable to enter the market.[54] Additionally, the inefficiency produced by the present allocation of allowances will persist. A grandfathering system of the kind proposed mandates identical reduction percentages across the board, without factoring in any cost considerations whatsoever. Artificially inflated prices could greatly reduce the benefits of a market scheme. As a practical matter it is unclear the extent to which sources

52. Thaler, *Illusions and Mirages in Public Policy*, 73 PUB. INTEREST 60, 63-64 (1982) ("The endowment effect stipulates that an individual will demand much more money to give something up than he would pay to acquire it." *Id.* at 64).

53. The fact that many regulated sources are public utilities, overseen by state administrative agencies, may also ease any tendency to hoard. Agency scrutiny may provide a forum for exposing irrational behavior. *See House Hearings pt. 2, supra* note 2, at 221-22 (testimony of Richard Schmalensee, member, CEA).

54. *See* H.R. REP. No. 490, 101st Cong., 2d Sess., pt. 1, at 366-67 (1990) [hereinafter HOUSE REPORT] (This report discusses an earlier draft of the Amendment, but the cited portions are equally relevant to the enacted Amendment.).

would forgo the opportunity costs that the potential sale of their allowances presents. Nevertheless, to the extent that irrational motivations influence the decisions of participants, an auction market provides the most efficient system.

2. *Transactions Costs—Identifying Buyers and Sellers*

An auction market will exact lower transactions costs and therefore will cost polluters less than a market system that relies exclusively or primarily on standard sales, even given robust participation under both schemes. One factor which will affect transactions costs is the ease with which buyers and sellers are able to locate each other and negotiate a trade. These activities can be expensive. In past trading systems, individual buyers have spent thousands of dollars to locate an appropriate trading partner and execute a standard sale.[55]

Of course, a service might develop to provide potential traders with information. This service would lower transactions costs, but not reduce them as much as auctions would. Auctions, by nature, bring together buyers and sellers. Furthermore, they provide immediate price information, at least about the sale at hand. Finally, they ensure that the bilateral negotiations during the initial trade take place within a circumscribed period of time. As a result, negotiations cannot become protracted and unnecessarily costly. Auction sales thus provide a less expensive way to achieve and maintain the optimum allowance allocation.

3. *Enforcement*

Auction markets can produce greater efficiency by eliminating the incentive to hoard and by decreasing the transactions costs of locating trading partners and negotiating trades. They can also be structured to improve efficiency indirectly by encouraging enforcement. Auctions charge polluters for their allowances. Professors Bruce Ackerman and Richard Stewart have observed that if EPA's budget were derived from the revenue generated by selling allowances, the agency would have a keener desire to insure compliance.[56] Were the agency lax in enforcement, the allowance price would drop significantly. Few polluters would pay for the right to pollute if they could pollute with impunity without buying that right. Therefore, if the agency wanted to maintain its revenue flow, it would have to enforce permit conditions.

55. Hahn & Hester, *supra* note 1, at 122 n.74.
56. Ackerman & Stewart, *supra* note 3, at 183.

B. *Exchange Methods and Equity Concerns—Reimbursing Society Versus Subsidizing Polluters*

Auction markets offer more than increased efficiency; they are also more equitable. The creation of pollution rights explicitly recognizes that polluting imposes a cost on society, and thus raises the question of who shall bear that cost. The decision as to whether the polluter should pay to pollute through an auction system, or whether society should absorb the cost through a grandfathering scheme, influences the equitable and political appeal of these systems.

Determining who should bear the cost of *polluting* does not significantly affect the total expense of *pollution control* imposed by the regulatory scheme. In both the grandfathering and zero-revenue auction schemes, the government gives allowances to polluters, so polluters pay only to reduce emissions or to purchase allowances in order to avoid making further reductions.[57] That is, they pay only the cost of pollution control. Polluters participating in auction markets, on the other hand, must pay an additional sum to purchase allowances from the government. This extra cost translates into a payment for the privilege of making legal emissions. It requires the polluter to pay society for suffering the harm of its polluting activities.

In deciding whether to charge polluters a fee to pollute, much will depend upon the societal perspective on the fairness of this approach. Thomas Tietenberg, in his book, *Emissions Trading: An Exercise in Reforming Pollution Policy*, maintains that fairness, as well as political considerations, dictate using a grandfathering or zero-revenue distribution method.[58] He classifies auctions, grandfathering methods, and zero-revenue auctions according to the resulting financial transfers—to either the government or other sources. He claims that auction markets result in transfers from industry to the government,[59] while grandfathering and zero-revenue schemes only produce transfers among sources.[60] Tietenberg assumes that under the present command and control system there is no financial transfer.[61] The unstated and incorrect premise of his analysis is that since polluters have enjoyed a free right to pollute, they are entitled to continue to do so; that they, in a sense, own pollution rights. There-

57. A grandfathering system should result in slightly higher total pollution control expenses, but only because of the additional transactions costs surrounding standard sales. Note that under a grandfathering scheme the distribution rule governs the financial burden of pollution control borne by individual sources (though not by the entire regulated industry), by determining which sources will be buyers and which will be sellers. T. TIETENBERG, *supra* note 1, at 101.

58. *Id.* at 102.

59. *Id.* at 99; *see also* Hahn & Noll, *supra* note 5, at 74.

60. In a market system which gives permits away, the transfer of money is between affected sources. Sources with higher marginal abatement costs purchase a greater number of permits, transferring money to affected sources with lower marginal abatement costs. Of course, even the sources which transfer money to others end up with lower pollution abatement expenditures.

61. T. TIETENBERG, *supra* note 1, at 97-102.

fore, when the government forces them to pay for rights that they already own, there is a transfer from industry to the government.

An arguably more accurate characterization would identify society, not polluters, as the primary "owners" of clean air or air rights. Given this contrasting assumption, fee structures that charge polluters to pollute are better understood as facilitating simple transactions between buyers (the polluters) and sellers (society as a whole). The polluters are purchasing society's right to enjoy unpolluted air. Historically, industry has been "purchasing" and society has been "selling" rights to pollute the air at the very undervalued (or inefficient) price of zero. Under the auction system, society would finally establish a market price for this commodity. Industry's payment for allowances would compensate society for its loss of clean air. Conversely, under "give-away" systems like the Amendment, the status-quo financial transfer from society to industry continues unchallenged. This analysis recognizes "give-away" programs for what they are: a subsidy by society to existing polluters.

Society however may wish to subsidize existing polluters.[62] Fear of industry shut-down and the accompanying loss of jobs, as well as the distributional effects of higher prices for goods produced by regulated industries, are valid concerns.

C. *Congress' Choice*

It is curious that Congress has opted to grandfather allowances, given the reasons in favor of an auction market. To review: auction markets exact lower transactions costs by reducing the number of costly bilateral negotiations. Furthermore, they oblige polluters to obtain allowances by using the market mechanism, so participants are more likely to overcome psychological barriers against trading, even where trading poses unknown risks and costs. In addition, auction systems may provide institutional incentives that should encourage EPA to enforce pollution regulations. Most importantly, auction markets oblige polluters to compensate society for the costs imposed upon it by their polluting activities. It would seem, then, that an auction system provides a slightly more efficient and thoroughly more equitable market system than the Amendment's.

However, the Amendment's system has one great advantage over an auction scheme: its political appeal to influential interest groups. The Amendment provides regulated industries with valuable allowances, which they can trade for money. It also pleases environmentalists by realizing a significant reduction in pollution. The only parties that stand to lose from this scheme are prospective sources, who will not receive free allowances. In order to enter the market, they will have to purchase allowances, even though there is no guarantee that

62. For a comprehensive analysis of the indirect effects of placing the burden of paying for the harmful effects of polluting on industry, see T. TIETENBERG, *supra* note 1.

an adequate supply at a competitive price will be available.[63] But these sources, being *prospective*, did not exist during the passage of the Amendment. Therefore, they exerted no pressure on legislators. For these reasons, the Amendment had a better chance of passage without an auction scheme.[64]

IV. THE GENERATION OF AN ACTIVE MARKET

Despite the shortcomings of its exchange method, Congress' trading scheme will very likely generate a healthy market. It might be a less equitable and slightly more expensive scheme, but, as this Part shows, there are ways to compensate for many of the efficency shortcomings of grandfathering schemes pointed out in the previous discussion. Of course, numerous variables must coalesce before a grandfathering system will produce a viable market. There must be a proper composition of active participants to support it.[65] This requires not only an adequately large pool of traders, varied enough in their need for allowances to insure that some will buy and some will sell,[66] but also a willingness on their part to use the system. Additionally, the allowances must be readily available and must retain their economic value. All of these variables can operate in a mutually supportive manner.[67] However, it is also true that any one variable might operate to discourage potential market activity. This Part discusses how well the Amendment's scheme meets the conditions for generating and sustaining a market to control acid deposition.

Since this Note assumes that the Amendment's market has the proper composition of regulated sources, the first focus will be on the participants' willingness to use the system. Two main factors will influence the willingness of potential traders to patronize the market. First, there must be an incentive to trade. Second, transactions costs must be sufficiently low to maintain this incentive.[68] In other words, unless polluters perceive the gains from trading to be greater than its costs, no market will evolve.[69]

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63. Section 416 insures a supply of allowances for new sources, but at double the price. *See supra* note 41.

64. A zero-revenue auction scheme might have provided a second-best alternative, by securing the efficiencies of an auction system. Furthermore, zero-revenue auction and grandfathering schemes have equal political appeal. They both make society, not the polluter, pay for the harmful effects of polluting. *See* Hahn & Noll, *supra* note 5, at 75-76. Unfortunately, zero-revenue auctions place greater administrative burdens on the government and bring in no revenue in return. It is therefore fortuitous that the Amendment contemplates auctioning only a small fraction of the total pool of allowances in this manner.

65. Hahn & Noll, *supra* note 5, at 66.

66. Tripp & Dudek, *supra* note 4, at 376.

67. Some markets with grandfathered pollution rights have been successful. *See* Hahn, *supra* note 2, at 101-03 (discussing success of EPA's lead trading program); *cf.* Tripp & Dudek, *supra* note 4, at 382-84 (anticipating success of new market system designed by EPA to reduce chlorofluorocarbon production).

68. *See* Hahn & Hester, *supra* note 1, at 140-41. *See generally* Roberts, *supra* note 5, at 104-06 (discussing incompatibility of lowering transaction costs and maintaining strict oversight of polluters).

69. Furthermore, no small group of buyers or sellers should control a sufficiently large portion of the supply or demand as to give them market power. *See* T. TIETENBERG, *supra* note 1, at 125-49; Hahn & Noll,

A. *The Incentive to Trade*

Participants must perceive a potential to profit from trading allowances. The Amendment primarily uses a grandfathering system. Thus initial trading will occur only if the abatement costs for the different sources vary enough that the primary distribution of allowances is so inefficient as to insure that the gains from trading will be greater than the costs. Costs of trading include both the price of the allowances, which should reflect the risk of future unavailability, and the transactions costs which necessarily surround the sale. Obviously, the probability of large gains from single trades will be greater where the initial distribution is enormously inefficient, and the transactions costs surrounding the trades are low. A corollary observation is that perhaps no trading will take place if the initial allocation of allowances is not adequately inefficient.

The potential market participants of this system appear to face significant differences in abatement costs. Larger plants, for example, can exploit economies of scale in pollution reduction and sell their allowances to smaller sources with higher abatement costs. Because the government will initially auction off a certain number of allowances, the first allowance distribution will not be as inefficient as under a straight grandfathering method. However, given the small number of allowances that will be auctioned and the positive incentives to trade that introducing the partial auction will provide, it is unlikely that this auction will substantially impair the Amendment's emissions market. To the contrary, the auction component was introduced into the scheme as "an attempt to 'jump start'" allowance trading, "should it not evolve organically."[70]

B. *Transactions Costs*

The lower the transactions costs, the greater the gains from trading. The following features foster lower transactions costs: a process for buyers and sellers easily to identify each other;[71] current market price information that is readily available and accurate enough to be used by buyers in their cost-

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supra note 11, at 134-37; Hahn & Noll, *supra* note 5, at 75 & n.37. Although this is a major concern relevant to the success of a market, it is so unlikely to be a problem in this situation that this Note will forgo discussion of it. Auctions have the additional advantage in that they reduce the probability that any one source will control a sufficient percentage of the supply or demand to exercise market power. Hahn & Noll, *supra* note 11, at 134-45. For a brief outline of why the Amendment's market scheme should easily escape this problem, see *House Hearings pt. 2*, *supra* note 2, at 223, 228 (Testimony of Richard Schmalensee, member, CEA); *see also* HOUSE REPORT, *supra* note 54, at 366 ("[T]here seems to be little or no positive reason for . . . a utility or group of utilities to hold on to allowances to drive the price up in order to corner the market or gain competitive advantage and, of course, there are obvious legal reasons not to do so."). The concentration of allowances is a factor. A greater risk of collusive behavior arises if too many allowances are concentrated in the hands of a small number of participants. With respect to both the utility holding companies and the different states, concentration will be sufficiently low. *House Hearings pt. 2*, *supra* note 2, at 218-19 (Testimony of Richard Schmalensee, member, CEA).

70. HOUSE REPORT, *supra* note 54, at 366.

71. Hahn & Hester, *supra* note 1, at 140-41.

benefit analyses; and streamlined rules common from state to state governing trading procedures.

As indicated earlier, the auction system best facilitates buyers' and sellers' searches for each other. However, under this scheme, most sales will not be by auction. Fortunately, two factors unique to acid deposition control regulation should help bring together buyers and sellers. First, the bill primarily targets large electric utility plants, of which there are a relatively small number nationwide. Phase I regulates only 111 plants. Phase II includes many smaller plants bringing the total number of regulated sources to approximately 2,054. The singularity of the regulated industry and the limited number of regulated sources should lower the transactions costs of standard sales by simplifying searches for transaction partners.

The second practical aid to potential traders is the existence of contractual relationships among many groups of independent electric utilities to insure that each has a readily available, emergency supply of power. These "power-pooling" arrangements provide many members of the regulated industry with a regular flow of information about the practices and costs of the other sources in the pool.[72] Given these factors and the possibility of establishing an information clearinghouse (discussed *infra*), the transactions costs involved in locating trading partners might be reduced to a minimum.

Another influence on transactions costs is a system's ability to provide an indication of the current market price of allowances in the event of meager early trading.[73] Potential market users must perform a cost-benefit analysis to determine the economic benefits of trading. Unless the polluters can forecast, at least approximately, the costs of requisite allowances, they will not know whether to use the market. Thus, the failure of a system to produce a reliable indicator of market price will lead to a downward spiral in the use of the market.

An auction scheme would be less dependent upon the emergence of a reliable market price.[74] All necessary trading could take place during the auction, eliminating the need for prior knowledge of market price. The proposed scheme however will require robust standard trading to provide an accurate indication of current market price. Two economists have warned that "[i]nfrequent trades would produce infrequent and possibly highly variable price signals that undermine the ability of polluters to make efficient choices of levels and methods of abatement."[75]

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72. *See Senate Hearings pt. 5*, *supra* note 51, at 285-91 (letter to Sen. Baucus by Daniel Dudek, Senior Economist, Environmental Defense Fund).

73. Hahn & Noll, *supra* note 11, at 137-42.

74. Auctions should also "maximize[] the amount of information conveyed by the initial price signal," by allowing the price to be set by all participants, not simply those who received an inefficient initial allocation. Hahn & Noll, *supra* note 15, at 141-42.

75. *Id.* at 121.

The Amendment's combination of auction and standard sales could either inhibit or aid the development of a price indicator. One can assume that some trading will occur in the zero-revenue auction market, so that the auction component will be likely to provide market price information. Of course, the price that will emerge will not reflect the transactions costs of a market which relies primarily on standard sales. How great a difference this omission will make will depend on the organization of the market which subsequently arises, and on the magnitude of the transactions costs it exacts.

On the down side, to the extent that trading in the zero-revenue auction reduces trades of the standard variety, the partial auction system may fare even worse than a pure grandfathering system in providing a reliable price indicator for the market. If post-auction trading is very light, the post-auction price may never stop fluctuating.[76] However, the allowances scheduled to be traded through these auctions comprise a very small percentage of the total pool, so the auction's effect on the market should be slight.

Fortunately, transactions costs can be lowered by means other than recent active trading. A private organization could establish an information clearinghouse similar to the option market quotation system. Participants would list the number and price of the allowances they wanted to sell.[77] This system would help participants identify willing buyers and sellers, and the price quotations would serve buyers in making their cost-benefit analyses. Alternatively, a privately run, periodic auction service could perform this function. Such a service would probably develop were the Administrator to turn over responsibility for the annual auction of the special reserve to the private sector.

A third factor influencing transactions costs is the simplicity of the trading process.[78] For instance, were each trade to require extensive paper work and approval through numerous bureaucratic channels, the transactions costs would escalate accordingly. Fortunately, in the case of acid deposition control, extensive oversight or complex procedures are unnecessary.[79] The permits held by sources are like accounts held with EPA. When allowances are distributed, the

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76. Hahn and Noll note a similar problem where the first distribution of allowances is based on a projected equilibrium of a smoothly functioning market:

> To the extent that the initial distribution [were to] succeed[] in finding the competitive equilibrium, it would also succeed in avoiding the necessity for any transactions among present sources. . . . Thus, a relatively speedy attainment of a stable, competitive price for permits would be least likely under this mechanism.

Id. at 138.

77. If at all possible, market forces and not the government should establish this clearinghouse. Government intervention should only help establish the market, assuming that no private entity was interested and should relinquish the task to the private market as soon as private forces would take over.

78. *See* Tripp & Dudek, *supra* note 4, at 376-77.

79. Because SO_2 emissions travel in the air channels over long distances and tend to end up in the same areas, even if they originate hundreds of miles apart, there is no need to examine each trade to insure that the polluters do not cluster in too small a region, thereby creating "hot spots". *See House Hearings pt. 2*, *supra* note 2, at 217-18 (testimony of Richard Schmalensee, member, CEA); *id.* at 18-19 (testimony of William K. Reilly, Administrator, EPA).

accounts are credited. When a trade is made, the buyer's account is credited and the seller's account is debited by the amount of the trade. When a source's CEMS is read, the amount on the reading is checked against its account. The system is no more complicated than a standard checking account.[80]

C. *Insuring a Supply of Allowances*

Even with enough allowances to go around, the supply will disappear if hoarding becomes a problem or if sources collusively withhold allowances from potential competitors. The organization of this market makes such problems unlikely.

The trading region of this system covers the entire United States, while the competition of the regulated industry is usually at a local level, so it is unlikely that participants can ever manipulate this market to erect a barrier to competition. A new independent power producer should easily be able to find a seller located in a different area of the country. Alternatively, the annual auction will provide the necessary allowances. If all else fails, the newcomer can avail itself of the direct sale of allowances, even if it means paying an inflated price.

The zero-revenue auction component should combat the participants' desire to hoard their allowances. This provision insures the availability of allowances on the market at fixed intervals. As a result, sources that might otherwise be reticent to sell their excess allowances, for fear that they might be unable to meet future growth needs,[81] will probably opt to trade.[82] Alternatively, sources concerned about ensuring themselves a future allowance supply might lease their allowances. Leasing should work especially well in the next few years as there are a number of older, dirtier plants, close to retirement that might prefer to lease allowances for the duration of their life span. This would allow the sources in states with high projected growth needs, in effect, to "hoard" their allowances while still keeping them available to the market.

D. *The Economic Value of the Allowances*

In order for allowances to retain their value, the Administrator must not flood the market with them and must enforce the rules of the market. The emissions cap, so well protected in this bill, prevents the former threat. Without an inflexible commitment to an emissions cap, a marketable permit scheme would never work effectively. The Administration would face constant political

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80. Telephone interview with Joe Goffman, *supra* note 25. *See also supra* note 23.

81. Concern over future growth needs surfaces throughout the debates over earlier versions of this Amendment. *See generally House Hearings pt. 2*, *supra* note 2; *Senate Hearings pt. 5*, *supra* note 51.

82. The zero-revenue auction component could have allowed the Administrator to increase the percentage of allowances to be auctioned should hoarding become a serious problem. Unfortunately, the Amendment expressly limits the number of allowances that may be auctioned. § 416(d)(1). This inflexibility strips EPA of its ability to experiment with the auction provision as an anti-hoarding device.

pressure to increase the number of allowances and give various sources special treatment in the form of extra allowances.

An auction system could have provided a better enforcement mechanism, as discussed in Part III.A.3. Still, the Amendment requires that every source participating in the market install a CEMS. Even substitute and voluntary sources will operate CEMS's. Verifying compliance with emissions limitations will therefore be much simpler and more likely to occur.

V. CONCLUSION

The Amendment's market scheme is praiseworthy. It includes a zealously guarded emissions cap, a bureaucratically simple trading process, adequate incentives to encourage active trading, and a manageable method by which to ascertain compliance. The major weaknesses of its exchange method (increased risk of hoarding and increased transactions costs) can be or have been mitigated by, among other things, the auction provision and the clearinghouse option. The decision to give away the allowances is the product of political compromise. While critics may object to the decision, it does not represent a structural flaw in the market. The equitable nature of a market scheme does not affect its vitality.

The challenge of controlling acid deposition provides an excellent opportunity to experiment with market schemes to control pollution. Implementing the Amendment will provide experience in establishing such a market system. The government should study its virtues and deficiencies in order to devise even better trading systems to control other forms of pollution. Unfortunately, there is no guarantee that any pollution control bill, no matter how sound, will solve our country's problem with acid deposition. Because a system will only be as effective as the people who command it, no mechanism will insure a perfect outcome. And even a poorly structured scheme will work well if a strong political will supports its goals. Since the Amendment, like any regulatory program, can be destroyed by inadequate execution, one can only hope that the executive branch's enthusiasm for marketable permit schemes will endure until our nation's problem of acid deposition is well under control.